

REMARKS

Claims 1-7 and 23, 25-34 are currently pending in the subject application and are presently under consideration. Claims 1, 7, and 34 have been amended while claim 24 has canceled as shown at pages 2-5 of the Reply.

Favorable reconsideration of the subject patent application is respectfully requested in view of the comments and amendments herein.

I. Rejection of Claims 1-7 and 34 Under 35 U.S.C. §102(b)

Claims 1-7 and 34 stand rejected under 35 U.S.C. §102(b) as being anticipated by Morris, *et al.* (U.S. 6,230,497). Applicants' representative respectfully requests that this rejection be withdrawn for at least the following reasons. Morris, *et al.* fails to describe each and every feature set forth in the subject claims.

A single prior art reference anticipates a patent claim only if it *expressly or inherently describes each and every limitation* set forth in the patent claim. *Trintec Industries, Inc. v. Top-U.S.A. Corp.*, 295 F.3d 1292, 63 USPQ2d 1597 (Fed. Cir. 2002); *See Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). *The identical invention must be shown in as complete detail as is contained in the ... claim.* *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989).

The subject invention is directed to a system for removing generated heat from hot spot areas and/or inducing heat at other area of the semiconductor chip to facilitate providing for a uniform temperature gradient across a semiconductor body. To this end, independent claims 1, 7 and 34 recite similar features namely: *at least one of the plurality of the thermoelectric structures has a distribution of line patterns that is denser towards center of its structure and decreases in density towards outer limits of the structure.* Morris, *et al.* fails to disclose or suggest such novel aspects of the subject claims.

Morris, *et al.* relates to a method and apparatus for monitoring and controlling temperatures at a semiconductor circuit by an array of thermoelectric cooler cells disposed proximate the semiconductor circuit. The apparatus includes a plurality of thermoelectric cooler cells each having respective thermo electric coolers with a designated cell area. Heat is

selectively added to and removed from the cell areas associated with various ones of the thermoelectric cooler cells based on the electrical activity at the cell. However Morris, *et al.* fails to teach or suggest a thermoelectric cooler having a denser distribution of line patterns towards the center of its structure and a less dense distribution of lines towards the outer limits of the structure as recited in the subject claims.

In view of at least the foregoing it is clear that an identical invention as recited in the subject claims is not taught or suggested by the cited reference. Therefore, this rejection should be withdrawn.

II. Rejection of Claims 1-7 and 34 Under 35 U.S.C. §102(b)

Claims 1-7 and 34 stand rejected under 35 U.S.C. §102(b) as being anticipated by Chu, *et al.* (U.S. 6,424,533). Applicants' representative respectfully requests that this rejection be withdrawn for at least the following reasons. Chu, *et al.* fails to describe each and every feature set forth in the subject claims.

A single prior art reference anticipates a patent claim only if it ***expressly or inherently describes each and every limitation*** set forth in the patent claim. *Trintec Industries, Inc. v. Top-U.S.A. Corp.*, 295 F.3d 1292, 63 USPQ2d 1597 (Fed. Cir. 2002); *See Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). ***The identical invention must be shown in as complete detail as is contained in the ... claim.*** *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989).

The subject claims relate to a system for regulating heat in an integrated circuit by maintaining a uniform temperature gradient throughout the semiconductor body of the integrated circuit. This is achieved by utilizing a plurality of thermoelectric structures to induce heat to and/or dissipate generated heat away from regions of the semiconductor body. To this end independent claims independent claims 1, 7 and 34 recite similar features namely: ***at least one of the plurality of the thermoelectric structures has a distribution of line patterns that is denser towards center of its structure and decreases in density towards outer limits of the structure.*** Chu, *et al.* does not teach or suggest such novel aspects of the claimed invention.

Chu, *et al.* relates to a thermal dissipation subassembly for cooling an electronic device. This thermal dissipation sub assembly has a thermal spreader with at least one thermoelectric device. The thermal spreader couples to the surface of the heat-generating component so that the thermoelectric device facilitates dissipation of higher heat flux (See Chu, *et al.* col.2 lines 57-65). The thermoelectric coolers 30 displayed in Fig.2A do not display a denser distribution of line patterns towards the center and a less dense distribution of lines towards outer limits of the structure as recited in the subject claims.

In view of at least the above, it is clear that an identical invention as recited in the subject claims is not taught or suggested by the cited document. Therefore withdrawal of this rejection is requested with respect to independent claims 1, 7, 34 and all the claims that depend there from.

III. Rejection of Claim 34 Under 35 U.S.C. §102(b)

Claim 34 stands rejected under 35 U.S.C. §102(b) as being anticipated by Brasington (WO 92/06561). Applicants' representative respectfully requests that this rejection be withdrawn for at least the following reasons. Brasington fails to describe each and every feature set forth in the subject claims.

A single prior art reference anticipates a patent claim only if it *expressly or inherently describes each and every limitation* set forth in the patent claim. *Trintec Industries, Inc. v. Top-U.S.A. Corp.*, 295 F.3d 1292, 63 USPQ2d 1597 (Fed. Cir. 2002); *See Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). *The identical invention must be shown in as complete detail as is contained in the ... claim.* *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989).

The subject claim relates to a system to mitigate the concentration of stress in an integrated circuit semiconductor body by creating a uniform temperature gradient throughout the semiconductor body. To this end independent claim 34 recites *the means for creating a uniform temperature gradient has a denser distribution of line patterns towards center of its structure and a less dense distribution of lines towards outer limits of the structure.* Brasington does not teach or suggest such novel aspects.

Brasington teaches a thermal buffer introduced between a thermoelectric cooler and a CCD array in order to provide for uniform temperature distribution throughout the CCD array to stabilize dark current. However, it does not teach or suggest a thermoelectric cooler with a line pattern that is denser in its center and less dense towards the outer region of its structure.

In view of at least the foregoing it is clear that an identical invention as recited in claim 34 is not taught or suggested by the cited reference. Therefore this rejection of claim 34 should be withdrawn.

IV. Rejection of Claims 1-7, 23, 25-26 and 32-34 Under 35 U.S.C. §102(b)

Claims 1-7, 23, 25-26 and 32-34 stand rejected under 35 U.S.C. §102(b) as being anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Levinson, *et al.* (US 6,098,408). Applicants' representative respectfully requests that this rejection be withdrawn for at least the following reasons. Levinson, *et al.* fails to describe each and every feature set forth in the subject claims.

A single prior art reference anticipates a patent claim only if it *expressly or inherently describes each and every limitation* set forth in the patent claim. *Trintec Industries, Inc. v. Top-U.S.A. Corp.*, 295 F.3d 1292, 63 USPQ2d 1597 (Fed. Cir. 2002); *See Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). *The identical invention must be shown in as complete detail as is contained in the ... claim.* *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989).

The subject claims relates to a system for reducing stress in a semiconductor body by mitigating the formation of hotspots. A plurality of thermoelectric coolers is employed to maintain a uniform temperature gradient throughout the semiconductor body. To this end independent claims 1, 7 and 34 recite similar features namely: *at least one of the plurality of the thermoelectric structures has a distribution of line patterns that is denser towards center of its structure and decreases in density towards outer limits of the structure.* Levinson, *et al.* fails to disclose or suggest such novel aspects of the subject claims.

Levinson, *et al.* relates to a system for regulating reticle temperature. It teaches employing a plurality of thermoelectric coolers mounted on a backplate of a chuck assembly.

The cold side of the thermoelectric coolers is operatively couple with the backplate, and the backplate thermally conducts heat between the reticle and the thermoelectric coolers. However as conceded on page 9 of the subject Office Action, Levinson, *et al.* does not teach a thermoelectric structure with a pattern of lines that is dense at the center and is progressively less dense towards the outer edges of the structure as recited in applicants' independent claims. Therefore, it is clear that an identical invention as recited in the subject claims is not taught or suggested by Levinson, *et al.* Therefore this rejection should be withdrawn with respect to independent claims 1, 7, 34 and all the claims that depend there from.

V. Rejection of Claim 24 Under 35 U.S.C. §103(a)

Claim 24 stands rejected under 35 U.S.C. §103(a) as being unpatentable over Levinson, *et al.* in view of Cannell, *et al.* (U.S. 6,729,383). Claim 24 has been canceled and the limitations have been included in the independent claim 1. Withdrawal of this rejection is requested for at least the following reasons. The cited references, either alone or in combination, fail to teach or suggest all limitations of the subject claims.

As stated *supra*, the invention as claimed provides for maintaining uniform temperature gradient of an integrated circuit by employing a heat regulation device with a thermal structure network assembly. As conceded on page 9 of the Office Action dated September 15, 2006, Levinson, *et al.* does not teach or suggest a thermoelectric structure with a denser distribution of lines towards the center of the structure and less dense towards the outer limits of the structure. Cannell, *et al.* fails to make up for this deficiency. Cannell, *et al.* relates to methods and apparatuses for cooling electronic components and other objects. At the cited section, Cannell, *et al.* discloses conventional heat sinks having different arrangements. However, Cannell, *et al.* does not teach or suggest an arrangement wherein *at least one of the plurality of the thermoelectric structures has a distribution of line patterns that is denser towards center of its structure and decreases in density towards outer limits of the structure* as recited in the subject claim. In fact, Cannell, *et al.* nowhere refers to thermoelectric structures let alone teach or suggest arrangements for thermoelectric structures. In forming such a structure, the subject invention is better able to address localized heating problems such as formation of hotspots within the semiconductor body. Therefore the cited documents either alone or in combination

fail to teach or suggest all features recited in the subject claim. Therefore, this rejection should be withdrawn.

VI. Rejection of Claim 27 Under 35 U.S.C. §103(a)

Claim 27 stands rejected under 35 U.S.C. §103(a) as being unpatentable over Levinson, *et al.* in view of Ghoshal (U.S. 6,105,381). Withdrawal of this rejection is requested for at least the following reasons. Claim 27 depends on independent claim 1. The cited references, either alone or in combination, fail to teach or suggest all features of independent claim 1.

As stated *supra*, the subject invention is directed towards mitigating the formation of hotspots in a semiconductor body of an integrated circuit by creating a uniform temperature gradient. To this end, it employs a plurality of thermoelectric structures wherein at least one thermoelectric structure has a denser distribution of line patterns towards the center and less dense towards the outer limits of the structure. As stated on page 9 of the subject Office Action Levinson, *et al.* does not teach or suggest such claimed aspects. Ghoshal fails to make up for this deficiency of Levinson, *et al.* with respect to independent claim 1. Ghoshal relates to an apparatus for cooling selected elements within an integrated circuit by transmission of heat from the integrated circuit to a cold plate. This heat is removed from the cold plate to a hot plate by a thermoelectric cooler. Although, Ghoshal discloses a passive spiral coil thermally coupling two coolers (*See* Ghoshal col.3 lines 60-62) it not teach or suggest that *at least one of the plurality of the thermoelectric structures has a distribution of line patterns that is denser towards center of its structure and decreases in density towards outer limits of the structure* as recited in the independent claim 1 from which the subject claim depends. In forming such a structure, the subject invention is better able to address localized heating problems such as formation of hotspots within the semiconductor body. From the foregoing, it is clear that the cited documents either alone or in combination do not teach or suggest all aspects of the subject claims. Therefore, this rejection with respect to claim 27 should be withdrawn.

CONCLUSION

The present application is believed to be in condition for allowance in view of the above comments and amendments. A prompt action to such end is earnestly solicited.

In the event any fees are due in connection with this document, the Commissioner is authorized to charge those fees to Deposit Account No. 50-1063 [AMDP812US].

Should the Examiner believe a telephone interview would be helpful to expedite favorable prosecution, the Examiner is invited to contact applicants' undersigned representative at the telephone number below.

Respectfully submitted,

AMIN, TUROC & CALVIN, LLP

/Himanshu S. Amin/

Himanshu S. Amin

Reg. No. 40,894

AMIN, TUROC & CALVIN, LLP
24TH Floor, National City Center
1900 E. 9TH Street
Cleveland, Ohio 44114
Telephone (216) 696-8730
Facsimile (216) 696-8731